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dured by us from June 28 to Dec. 5, 1887, and from June 1, 1888, to the present date, to continue again from the present date till about Dec. 10, 1888, when I hope then to say a last farewell to the Kongo forest."

Mr. Stanley's description of the daily course of things in the forest region is worth quoting: "The mornings generally were stern and sombre, the sky covered with lowering and heavy clouds; at other times thick mist buried every thing, clearing off about 9 A.M., sometimes not till 11 A.M. Nothing stirs then: insect-life is still asleep; the forest is still as death; the dark river, darkened by lofty walls of thick forest and vegetation, is silent as a grave; our heart-throbs seem almost clamorous, and our inmost thoughts loud. If no rain follows this darkness, the sun appears from behind the cloudy masses, the mist disappears, life wakens up before its brilliancy. Butterflies scurry through the air, a solitary ibis croaks an alarm, a diver flies across the stream, the forest is full of a strange murmur, and somewhere up river booms the alarum drum. The quick-sighted natives have seen us, voices vociferate challenges, there is a flash of spears, and hostile passions are aroused."

Stanley does not give very detailed information regarding the tribes met with, except the statement that five different languages are spoken. He says that Negambi Rapids, about two hundred and fifty miles above the junction of the Aruvimi and the Kongo marks the division between two different kinds of architecture and language. Below, the cone-huts are to be found; above the rapids we have villages, long and straight, of detached square huts surrounded by tall logs, which form separate courts, and add materially to the strength of the village. Many precautions had to be adopted against attacks by poisoned arrows. Mr. Stanley lost several men by these arrows, and Lieut. Stairs had a narrow escape. It was afterwards found that the poison is manufactured from the dried bodies of red ants or pismires ground into powder, cooked in palm-oil, and smeared over the wooden points of the arrows. As might have been expected, the forest is haunted by myriads of insects of every variety.

#### THE INFLUENCE OF CERTAIN DRUGS ON PHYSICAL STRENGTH AND ENDURANCE.

T. FREDERICK PEARSE, M.D., in an article in *Knowledge*, says that certain drugs have a great reputation for increasing physical endurance. These are chiefly coca, caffeine, and kola-nut; and there are certain other chemical compounds of analogous composition which are derived from muscular tissue, and have been found experimentally to have a similar effect. These are chiefly creatine and hypoxanthine. The chemical relation of all these substances is very interesting. Strange to say, some are themselves the products of muscular waste. It will be noticed, also, that creatine and hypoxanthine occur in beef-tea, which is so well known as a general restorative and as a nervous stimulant, and there is ample experimental proof that it assists muscular power. The chemical relationship of the alkaloids found in tea, coffee, kola, and coca to the products of muscle-tissue metamorphosis suggests that these products are either replaced in the muscular tissue by these drugs, or that the products act on the nervous system either as a food or as a stimulant, and are merely supplemented in their action by the drugs. It is a very interesting question whether these alkaloids act locally on the muscle substance or upon the central nervous system.

As we know that tea, coffee, cocoa, and beef-tea sustain and strengthen the nervous energies when they have been exhausted by other than prolonged muscular action, the inference is that these substances, as well as the analogous products of muscular tissue, act also directly as food or stimulant to the nervous centres. Dr. Pearse has tested and found by experiment the powers of caffeine in increasing the respirations, and in strengthening as well as increasing the rapidity of the heart's action.

The following statements have been made by different writers as to the value of these substances. Of coca, *Markham's Peruvian Bark* says it enables a greater amount of fatigue to be borne with less nourishment, and it lessens the difficulty of respiration in ascending mountain-sides. The *Practitioner* says, "The leaves

are chewed to appease hunger and support strength in the absence of food, and used generally for the stimulant and narcotic effects of tobacco and alcohol;" the *Lancet*, "It is of use to steady nerves of excitable persons (to a sportsman in shooting, for example), to give endurance; it is used by travellers in Bolivia and Peru to counteract the effect of rarefied air on mountains." Lauder Brunton writes, "In small doses it is said to lessen fatigue and enable the Indians in Peru to make long marches, and a similar result has been obtained in trials upon soldiers in Germany." Experimentally, coca appears to act in small doses as a stimulant to the nervous system, affecting first of all the cerebral hemispheres, next the medulla, and lastly the spinal cord. It lessens the feeling of fatigue, but the only mental effect seems to be an exhilaration of spirits. Like caffeine, it increases the rapidity of the heart-beat, and raises the blood-pressure.

Experimentally, caffeine has been found, in small doses, to quicken the respiration and also the pulse. It seems to affect the accelerating centre directly, as its action is equally well defined after the nerves have been divided. Besides increasing the rapidity of the heart's action, it seems also to strengthen it, and it raises the blood-pressure. Caffeine also seems to lessen tissue change and waste. In addition, caffeine appears to have some power in paralyzing the conducting power of the sensory parts of the spinal cord, and it may be in this way that it relieves the sense of fatigue. At the same time, however, it is found to increase generally the functional activity of the spinal cord. H. C. Wood says, "The peculiar wakefulness, the increased mental activity, and the often nervous restlessness which are induced by strong coffee are familiar to almost every one. By doses of two or three grains of caffeine, a very similar state of the body is induced. The increase of brain-power which has been noticed by various observers after caffeine, as well as after coffee, tea, guarana, and all the allied crude drugs, is undoubtedly real, and must be due to a direct stimulant action on the cerebrum. It appears to me that the cerebral stimulation of caffeine differs from that of opium, in that it affects the reasoning faculties at least as profoundly as it does the imagination. Coffee prepares for active work both mental and physical; opium, rather for the reveries and dreams of the poets. The enormous use made by mankind of substances containing caffeine indicates that in some way it is directly of service in the wear and tear of life."

The nuts from the kola-tree (*Sterculia acuminata*), a native of tropical Africa, are used to support the strength, allay the appetite, assuage thirst, and assist the digestion. They have also a reputation for increasing the capacity to bear prolonged fatigue. The kola-nuts contain a large percentage of the same chemical principle, theine, as is contained in tea and coffee. They also contain an aromatic volatile oil, to which some of their properties must be attributed. The seeds have been employed as a remedy for drunkenness, and they are said to abate the drink-crave. By virtue of the alkaloids, caffeine and theobromine, contained in kola, it must act as a cardiac tonic, improving both the force and rhythm of the heart. The kola-nut is slightly bitter and astringent, and its reputed value in digestive disturbances and diarrhoea may be based on these properties.

Of all inorganic compounds, the phosphates seem perhaps of the greatest importance in animal tissues. They are found in considerable quantity in the human body wherever active cell-growth is going on. They must be ranked among the most valuable and necessary foods. Their acknowledged value in disorders of the nutritive system of children, and also in convalescence from acute as well as wasting diseases, in all of which rapid growth and tissue development is taking place, is good ground for the practical inference that they are intimately concerned in nutrition generally, and especially in the recuperation of parts worn out by disease. The recovery from prolonged and severe exertion also may very probably be assisted by them. The compounds of the meta-, pyro-, and hypo-phosphates, in which the element phosphorus is loosely combined, seem much more efficacious than the ordinary salt. According to Ashburton Thompson, repeated doses of phosphates improve the appetite, increase the rate of the circulation, sharpen the mental faculties, increase the muscular power, and give a sensation of well-being.

Creatine and hypoxanthine are said, in small doses, to have the power of increasing muscular work, and to cause the muscle to recover rapidly after exertion. Creatine particularly is said to have this power to a great extent. Glycogen is also classed with these substances, and is said to have great power of increasing muscular capability.

In practice, however, we all recognize a difference in the action of the popular mixtures, — tea, coffee, cocoa, etc. In many persons tea will stimulate, and in a few it exercises a marked action on the kidneys and bladder. Coffee, again, will keep some people awake, while tea does not have the same effect with them. With some individuals it acts as a mild aperient. Coca does not seem to have any decided action on the digestive organs or kidneys.

We find, therefore, that the reputation for sustaining the strength, appeasing hunger, and temporarily increasing the physical powers, which coca, kola, coffee, and tea have in the respective parts of the world in which they are indigenous, is borne out by experiment. Moreover, there seems a probability that physiological science will shortly be able to provide a satisfactory explanation of the practical value of these substances.

#### BOOK-REVIEWS.

*Francis Bacon, his Life and Philosophy.* By JOHN NICHOL. Part II. Bacon's Philosophy. Edinburgh, Blackwood. 16°. (Philadelphia, Lippincott, \$1.25.)

THIS is the latest issue in Messrs. Blackwood's series of Philosophical Classics. In the first part of the work, Professor Nichol gave an account of the life of Bacon, and in this he gives an exposition of his philosophy. He first recounts the efforts of previous thinkers, ancient and modern, to solve the physical problems of the universe, and shows how most of them failed, owing to neglect of observation and experiment, which we now know to be the most essential means of discovering physical truth. He points out, however, that before the appearance of Bacon's works the right method had come into use, and Copernicus, Kepler, Galileo, and others had made important discoveries by the use of it. Hence Bacon cannot be credited with discovering the new method, but only with being the first to generalize it and give a philosophical theory of it. He shows, as others have done, that Bacon recognized more or less clearly the various experimental methods now acknowledged by logicians, while at the same time he pointed out the defects in the induction of the ancients. Bacon also made a survey and classification of the sciences, which has not even yet lost all its interest, and which at the time it was written was quite remarkable. Bacon must also be credited, notwithstanding the defects in his moral character, with an earnest desire to serve his fellow-men, "believing," as he says of himself, "that I was born for the service of mankind." Such being his merits and such his purposes, it is important to inquire why it was that his own attempts to discover the secrets of nature resulted in nothing but failure. Professor Nichol discusses this question at considerable length, and expresses the opinion that Bacon failed partly because he had too ovenweening a sense of the power of his method, and partly because he thought the universe a far simpler thing than it really is; and he quotes Bacon's own remark, that he "should presently disclose and bring into sight all that is most hidden and secret in the world," as showing what extravagant expectations he had. But the main reason for Bacon's failure was that in his own researches he was seeking for something that does not exist. His object was to find the "forms" of things, and there has been some difficulty in ascertaining what he meant by this term. He certainly did not mean causes, and the true view is doubtless that expressed by Mill in his "Logic," and adopted by Professor Nichol. The "forms" were something "related to permanent qualities as efficient causes are to changes or events." Or, as Mill says, Bacon "seems to have thought, that, as every event has an invariable antecedent, so every property of an object has an invariable co-existent, which he called its form." But, as both Mill and Professor Nichol remark, there is no such invariable co-existent of each property of a thing; and hence Bacon, in his search after "forms," was pursuing *ignes fatui* with the usual result of landing in a bog. The failure of his own researches, however, should not blind us to his real contribu-

tions to the theory of method; and what these contributions were Professor Nichol has pointed out in the pages of this interesting work.

*Curve Pictures of London for the Social Reformer.* By ALEX. B. MACDOWALL, M.A. London, Sampson Low. 16°.

THIS little book is intended by its author to represent, in a pictorial form, such statistics and other information as are necessary for the social reformer in his efforts to deal with the great problems which he has undertaken to help to solve. Like the leader of an army setting out on a campaign, those who are bent on doing something to right the wrongness of our social state (especially through legislation) should see clearly what *is*, while cherishing an ideal to be realized. To furnish such a guide has been the author's endeavor. Diagrams are given by which one can ascertain for a series of years the following: population; density of population; birth, marriage, and death rates; early marriages; death by disease; suicides; drunkenness; felonies; licensed houses; apprehension; pauperism; education; illiteracy; prices of commodities and prices of meat.

*Marriage and Divorce in the United States.* By D. CONVERS. Philadelphia, Lippincott. 16°. \$1.25.

THE author of this work is a clergyman, and writes from a high-church point of view. He starts out with the remark that "marriage and divorce in the United States are in an unsatisfactory condition," and then goes on to criticise our marriage laws in detail. He calls attention to the looseness of these laws in some of the States, and to the difficulties often arising from the difference in legal requirements in different States. He strongly condemns the common-law doctrine of marriage, according to which all that is necessary to constitute a valid marriage is a mutual declaration by the two contracting parties that they take each other as husband and wife, followed by cohabitation; although he is obliged to admit that this is and always has been the canon law of the Christian church. He condemns marriage with a deceased wife's sister, which he declares to be incest. On the subject of divorce he takes the extreme scriptural ground, holding to the principle "once married, married till death." He would allow separation in case of fornication, but without liberty to marry again; while absolute divorce, such as the law now grants, he considers an abomination. He gives some tables and charts showing the rates of marriage and divorce in the different States of the Union, which will be useful to students of the subject, and also many interesting examples to illustrate the defects and inconsistencies in our marriage laws. The fault of his work is, of course, the extreme view he takes of the indissolubility of the marriage tie, — a view which the mass of men will not accept, and which it is impossible to embody in legislation. Our marriage and divorce laws need reforming, but the work must be done in a sensible and practical way, and not in a spirit of hide-bound conservatism.

#### AMONG THE PUBLISHERS.

IN the *Fortnightly Review* for April (New York, Leonard Scott Publication Company, 29 Park Row), Sir Charles Dilke presents the second of his series on the frontiers of India. These papers, while partly military, are largely made up of descriptions of places seldom visited by Europeans. H. H. Johnston discusses the question "Are our Foreign Missions a Success?" from the point of view of the political economist, and finds their indirect influence in matters of education and enlightenment of positive value. W. M. Gattic tells of some scandals of the English lighthouse boards, Professor J. R. Seeley's address on ethics and religion before the Ethical Society of Cambridge is printed in full. Arsene Houssaye, probably the only living survivor of the poet's friends, contributes the first section of a delightfully gossiping paper on Alfred de Musset. Mr. W. H. Mallock joins the agnostic controversy with a paper entitled "Cowardly Agnosticism," in which he points out a number of startling facts. Two papers from opposite standpoints treat of the enfranchisement of women, by Miss Fawcett and Stuart Glennie, which are especially timely in view of the fact that two bills are now before Parliament giving the suffrage to women.